WHAT IS CLAIMED IS

1. A low drop-out voltage regulator having an adaptive frequency compensation means, comprising:

a regulated DC output terminal;

an unregulated DC input terminal;

an output section having an output capacitor and an output load, wherein said output load is connected from said regulated DC output terminal to the ground reference, wherein said output capacitor is connected in parallel with said output load;

an output pass transistor for supplying power to said output section, wherein said output pass transistor has a source coupled to said unregulated DC input terminal, wherein said output pass transistor has a drain connected to said regulated DC output terminal;

a control circuit for controlling a gate of said output pass transistor; and

a current-controlled resistor for generating a zero-pole, wherein said current-controlled resistor generates an additional equivalent series resistance (ESR).

2. The low drop-out voltage regulator according to claim 1, wherein said control circuit comprises:

an error amplifier for generating a common gate signal, wherein said error amplifier has a negative input connected to a first reference voltage terminal;

an AC feedback terminal for supplying a high-frequency feedback signal to said error amplifier;

a blocking capacitor for blocking DC components from said AC feedback terminal, wherein said blocking capacitor is connected between a positive input of said error amplifier and said AC feedback terminal;

a feedback transistor for supplying a feedback current to said AC feedback terminal, wherein said feedback current is proportional to an output current of the output section, wherein said feedback transistor has a source coupled to said unregulated DC input terminal, wherein said feedback transistor has a drain coupled to said AC feedback terminal;

a DC feedback terminal for supplying a steady-state feedback signal to said error amplifier, wherein said DC feedback terminal is connected to said regulated DC output terminal; and

a large-resistance resistor for maintaining the DC accuracy of the feedback signal, wherein said large-resistance resistor is connected between said DC feedback terminal and said positive input of said error amplifier, wherein said large-resistance resistor is a device with an equivalent resistance of 10 MΩ or more.

3. The low drop-out voltage regulator according to claim 1, wherein said current-controlled resistor is connected between said regulated DC output terminal and said AC feedback terminal, wherein said current-controlled resistor comprises:

an input current terminal;

a first pole-zero transistor having a drain connected to said regulated DC output terminal, wherein said first pole-zero transistor has a source connected to said AC feedback terminal;

a second pole-zero transistor having a drain connected to said input current terminal, wherein said second pole-zero transistor has a gate connected to a gate of said first pole-zero transistor and said drain of said second pole-zero transistor;

a third pole-zero transistor having a drain connected to a source of said second pole-zero transistor, wherein said third pole-zero transistor has a source connected to a

second reference voltage terminal;

a pole-zero comparator having an output connected to a gate of said third pole-zero transistor, wherein said pole-zero comparator has a negative input connected to said AC feedback terminal, wherein said pole-zero comparator has a positive input connected to said drain of said third pole-zero transistor; and

a current-controlled current sink having an input connected to said input current terminal, wherein said current-controlled current sink has an output connected to the ground reference.

4. The low drop-out voltage regulator according to claim **3**, wherein said current-controlled current sink comprises:

a first current-sink transistor having a gate connected to a common gate signal terminal, wherein said first current-sink transistor has a source connected to said unregulated DC input terminal;

a second current-sink transistor having a drain connected to a drain of said first current-sink transistor, wherein said second current-sink has a source connected to the ground reference; and

a third current-sink transistor having a gate connected to a gate of said second current-sink transistor and said drain of said second current-sink transistor, wherein said third current-sink transistor has a drain connected to said input current terminal, wherein said third current-sink transistor has a source connected to the ground reference;

5. The low drop-out voltage regulator according to claim **1**, wherein said common gate signal is provided by an output of said error amplifier to said gate of said output pass transistor and a gate of said feedback transistor.

6. The low drop-out voltage regulator according to claim **1**, wherein said

feedback transistor and said output pass transistor are arranged such that the current from said source of said output pass transistor is at least 500 times greater than the current from said source of said feedback transistor.

7. The low drop-out voltage regulator according to claim **2**, wherein said large-resistance resistor comprises:

a current sink for biasing said large-resistance resistor, wherein said current sink has an output connected to the ground reference; and

a current mirror having a first lr-transistor and a second lr-transistor, wherein said current mirror is coupled to an input of said current sink, wherein a source of said first lr-transistor and a source of said second lr-transistor are connected to said DC feedback terminal, wherein a drain of said first lr-transistor is connected to said positive input of said error amplifier.

8. The low drop-out voltage regulator according to claim **1**, wherein said low drop-out voltage regulator is stable for any parasitic ESR of said output section less than 50 mΩ.

9. A method of circuit operation in a low drop-out voltage regulator comprising:

accepting a reference voltage at an error amplifier, wherein an output of said error amplifier supplies a common gate signal;

controlling a first transistor by means of said common gate signal to produce an output signal at an output terminal of the voltage regulator from an unregulated input voltage;

controlling a second transistor by means of said common gate signal to supply a high-frequency feedback signal from said unregulated input voltage to an input of said error amplifier;

introducing a zero into the transfer function of the voltage regulator by means of a current-controlled resistor, such that the circuit will be stable when the ESR of an output capacitor of the voltage regulator is lower than 50 mΩ;

supplying said output signal of the power supply to an input of said error amplifier via a large-resistance resistor, wherein the resistance of said large-resistance resistor is at least 10 MΩ; and

modulating said common gate signal based on the sum of said high-frequency feedback signal and said output signal supplied to said error amplifier.

10. The method of circuit operation in a low drop-out voltage regulator according to claim **9**, wherein for a given gate voltage, the output current of said first transistor is at least 500 times greater than the output current of said second transistor.